



## Modified Wood Stove, innovative windmill and other devices

**Energy**  
*Appreciation*

**Bharat Amrutlal Agrawat**  
Junagadh, Gujarat

### Background

Bharat Agrawat (40) has innovated a multipurpose wood stove with two burners at different elevations that can efficiently run using both, wood and coal as fuel.

He has studied up to class tenth and has been running agricultural equipments' workshop for past 25 years. His family consists of his father (who is an innovator himself and a national awardee of NIF), grandmother, wife and three children.

His father, Amrutbhai was a Pujari in temple, began his life as a farm worker after discontinuing his studies in fifth class. He had set up a small farm machinery workshop. Later he also started making iron doors, boxes for granaries and iron gates. Bharat started helping his father since he was in sixth standard.

He has built many devices. The list includes a lemon cutter, innovative windmill for lifting water from wells, 5 HP power tiller cum tractor, which can be rotated at 360° angles and many more equipments

besides the modified stove.

He first made an innovative windmill, which included weight balancing gearbox system, designed to pump water out of the well at a rate of 2000-2200 litres/hour. He is an environmentalist and understands the need of utilizing natural resources to generate energy in an efficient and eco-friendly way to power different applications. This was also tested by GEDA, Vadodara.

This bent of mind has influenced his choice of innovations to be developed. Energy optimization has been a constant focus of all his endeavours such as the present one-the modified wood stove.

### Genesis

Traditional wood stoves, by virtue of their design, do not optimally use the heat generated and also emit much smoke and pollutants due to incomplete combustion.

Bharatbhai fitted an exhaust chute to a wood stove and noticed that a lot of heat was still coming out,

which made him infer that non-utilization of heat was the major fault in existing wood stoves.

He decided to solve the problem by facilitating better heat utilization through sufficient air supply and a correct channel for burning. To improve it further, he developed a mechanism for simultaneous heating of multiple vessels using the same heat source.

Bharatbhai made the first model of this stove in 1999, then after a few modifications, he came up with this multipurpose stove, which two multilevel burners and a single fuel feeding point.

### Innovation

Among various innovations of his, only one dealing with cooking stove is taken up for elaboration. Stoves having three chambers connected in parallel are available in art; Astra stove (Jagdish K.S.2004, The development and dissemination of efficient domestic cook stoves and other devices in Karnataka Current Science 87(7):pp. 926-931). But these chambers are connected horizontally.



assembly's weight and cost by making stove body with GI sheet. He envisages building versions with different burner attachments.

While he has sold more than three-dozen units of the current model locally, he is planning to launch commercial versions having two burners with geyser and one burner with geyser.

This product may have considerable social impact and commercial potential.

In this case, the stove consists of two chambers, each with a burner for cooking, and a geyser for heating water. Both burners can be used simultaneously, saving time and using the heat effectively. The heating chambers are oriented at different levels in order to be able to completely utilise the heat energy produced connected to a chimney, which provides part of the draft.

Inside the main chamber, mud has been used as insulating material to retain the heat. There are air vents on the sides of the first chamber to allow cooling of stove so that it is not too hot to touch for the women/men using it.

Bharatbhai is working further on the stove and wants to add another chamber (which can be utilized for steam cooking). He wants to fine tune its thermal efficiency, reduce

